



# IT Talk

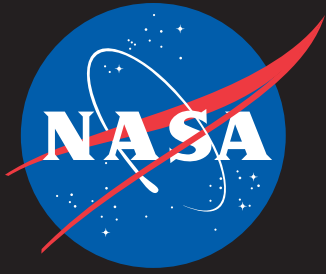
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## DAPHNE Connects Satellites to the Cloud





# IT Talk

Jul - Sep 2021 Volume 11 • Issue 3

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# Message from the NASA CIO

A cloud innovation implemented in the mission environment is saving NASA millions of dollars, and it's giving scientists quicker access to their data. The cloud solution is called "DAPHNE," which stands for Data Acquisition Processing and Handling Network Environment. This system was developed to eliminate the need for mission-specific hardware at ground stations. In this issue, we'll learn how DAPHNE is a technological leap over existing systems.

We'll also explore how cloud tools helped power Perseverance's mission to Mars and how they are keeping future NASA missions connected.

Finally, being able to work anytime and anyplace has become our new "norm." The NASA Office of the Chief Information Officer is working diligently to deliver the dependable IT capabilities that the NASA team needs to support both onsite and off-site work. We'll look at how NASA Centers are gearing up to support a hybrid work environment as we return to more onsite work, including upgrades to our NASA conference room capabilities and low-cost devices that can add virtual meeting capabilities to smaller rooms when needed.

I hope the information in this issue is helpful, and we always welcome your feedback.

*Jeff Seaton*

NASA Chief Information Officer



## Supporting Return to Onsite Work with Video Teleconferencing Services Microsoft Teams Integration

By Sylvester Placid, Communications Strategist, Communications Program, Marshall Space Flight Center

As NASA begins planning to bring personnel back to Centers with the best possible work experience, videoconferencing capability will play a larger role than ever before. The Communications Program (CP) is working to bring more tools to conference rooms of all sizes by utilizing a new solution to enable Video Teleconferencing Services (ViTS) videoconferencing with popular collaboration services already in use across the Agency, including Microsoft Teams.

Smaller conference rooms will be able to use web camera and audio units, while medium-sized and large rooms will be able to use a new, upgraded videoconferencing bridge to enable this capability. Larger rooms will be able to integrate Microsoft Teams calls directly into videoconferences.

A new USB video bar built for small rooms and huddle areas will be able to

easily add video- and audioconferencing capabilities and videoconferencing integration with Microsoft Teams and other Agency collaboration services, such as Cisco Webex.

Soon, everyone will be able to participate in a wide array of videoconferences from NASA conference rooms, offices onsite at NASA Centers, and remote locations. For more informa-

tion, please contact your [CP Center Customer Service Representative](#).





# iPhone 12 and Apple Magnet Safety Information

By Theresa Roberts, End User Services Program Office Communications, Marshall Space Flight Center

In May, the U.S. Food and Drug Administration (FDA) released safety information announcing that [magnets in cell phones and smart watches may affect pacemakers and other implanted medical devices](#). This follows safety guidance published by Apple earlier this year [about the magnets inside iPhone 12 models and other devices and accessories](#).

The iPhone 12 is not currently approved to be offered as an enterprise-managed device, although a few Apple devices and accessories with magnets are orderable from the Enterprise Service Desk (ESD) catalog. Please keep the following information in mind if you obtain these devices or accessories for personal use or if the iPhone 12 (or other devices/accessories) are approved to be offered at a later time.

## What is MagSafe?

MagSafe is a technology Apple previously used to create a breakaway magnetic charging cable for the MacBook. The repurposed MagSafe name now refers to technology inside all of the iPhone 12 models and applicable accessories.

MagSafe uses a ring of magnets built into the back of the iPhone to connect to accessories, like cases and chargers, which also have magnets built inside. So, for example, a MagSafe charger will snap to the back of an iPhone 12 similarly to a magnet snapping to a refrigerator.

These powerful magnets, as well as other components of the iPhone 12, emit electromagnetic fields that might interfere with medical devices, such as implanted pacemakers and defibrillators.

These medical devices can contain sensors that respond to magnets and other components of the iPhone 12 and MagSafe accessories when in close contact.

## What Precautions Should I Take?

Apple advises users to keep [devices and accessories containing magnets](#) a safe distance (more than 6 inches/15 centimeters apart or more than 12 inches/30 centimeters apart if wirelessly charging) away from medical devices and to consult with a physician and the medical device manufacturer for specific guidelines.

If you suspect iPhone, Apple devices, or any MagSafe accessories are interfering with your medical device, stop using your iPhone, device, or MagSafe accessories immediately and contact your physician and medical-device manufacturer.

# Sending Out a Survey? Here's What You Need To Know About the Paperwork Reduction Act

By Claire Little, Agency PRA Officer, NASA Headquarters

Data and information are what make our work, well, work. But the way you gather that information could trigger something called the Paperwork Reduction Act (PRA), meaning that the Office of Management and Budget (OMB) has to approve your collection mechanism before you start using it. But how do you know when this is the case, or whom you should talk to for help?

The “when” is a little tricky. If you are collecting information only from civil servants, you do not need to go through PRA, simple as that. If you are collecting from members of the public—including contractors—you prob-

ably do. But why only probably? Well, if you are asking fewer than 10 people for information, then you are not subject to PRA. If you are asking for very brief and simple customer feedback or for an open-ended response to a casual question—for example, asking folks to click a happy or sad face to rate service, or a NASA social media account asking something like “What’s your favorite star?”—then also no to PRA. Finally, something that is an explicitly defined part of that person’s job, like a pilot filing a flight plan or a police officer writing a traffic citation, does not need to go through PRA. Everything else, though? Yes...probably. It is complicated.

As for the “how,” there are different answers depending on what you are doing. If you are sending out a survey, you just need to submit a short form with about a two-week turnaround. If you are doing anything else—an application, a registration form, etc.—it is a 5- to 6-month process, so get started early!

The “who” is the easiest! Whether you know for sure or just think your collection might be subject to PRA, contact me, the Agency’s PRA officer. I will help you figure out what you need to do and help you do it.



## Communications Program Accelerates Cloud Connectivity for NASA to Drive Innovation

By Sylvester Placid, Communications Strategist, Communications Program, Marshall Space Flight Center

The Communications Program (CP) is accelerating and enhancing connectivity to cloud service providers for NASA to keep the Agency ahead of the transition from on-premises data centers to cloud-based services for critical applications, including e-mail, collaboration, and real-time chat. CP manages NASA connectivity to NASA cloud partners such as Amazon Web Services, Google Cloud Platform, and Microsoft Azure. Just recently, CP completed a major upgrade to double the capacity of NASA’s primary connectivity to Microsoft 365 cloud services (Office, OneDrive, SharePoint, Teams) and enable up to **500 percent** growth over the previous throughput.

CP is introducing an innovation for NASA’s on-premises data centers to benefit from cloudlike functionality. The new Data Center Networking (DCN) capability enables customers using the Johnson Space Center (JSC) and Kennedy Space Center (KSC) data centers to migrate virtual servers between JSC and KSC seamlessly, without the need to reconfigure the servers after migration. This capability provides customers with the agility to easily move workloads between the two data centers quickly, increasing efficiency and reducing downtime. Workloads can also move between the data centers to avoid disruptions from weather or infrastructure outages to

help keep NASA personnel connected and productive.

CP is working to modernize, standardize, and upgrade NASA’s connectivity to additional cloud providers. This initiative will transition current cloud connectivity to utilize the Equinix Cloud Exchange Fabric (ECX) at independent exchange facilities located throughout the country, providing virtual direct connections with hundreds of cloud service providers to the NASA corporate network. This will reduce the time and cost to securely connect NASA to cloud providers while significantly increasing computing capacity.



# Science Collection



# Processing in Cloud



# Into the Hands of Scientists



# DAPHNE Connects Satellites to the Cloud

By Salem El-Nimri, DAPHNE Project Development Lead and Steve Sirotzky, Branch Head, Goddard Space Flight Center

How do we ensure that our rainwater is clean? How do we know about changes in Earth's connection to the Sun? Can we thrive on another planet? Getting climate and planetary data to the scientists who analyze them is what NASA does best. NASA's goal is to explore and advance knowledge for the benefit of humankind. To realize that, we at NASA reach up to space with scientific instruments to expand human understanding. Our probes collect vital data and send them back to Earth so scientists can decode the universe's mysteries.

To receive data from satellite missions, NASA depends on a collection of ground station antennas located all around the world. Because missions frequently have different wireless communication requirements, these ground stations are often equipped with "mission unique" hardware to allow these specific requirements to be met. These requirements can include special wireless modulation, handshaking to confirm that data were received properly, prioritization of certain types of data, the checking of science data for trends of interest, or distribution to special stakeholders. Having unique hardware to meet all of these needs adds cost to the Government.

An added complexity is that the majority of ground stations are located at remote places. Maintenance of unique hardware requires travel and shipping of parts that may support only one mission. This situation reduces scalability of those resources. In addition, the Agency has historically covered the cost of owning telecommunications at these remote sites. Each of these adds to the annual cost.

Recently, a solution was developed at Goddard Space Flight Center. The

Telecommunication Networks and Technology Branch (Code 566) and its engineers created the "Data Acquisition Processing and Handling Network Environment" (DAPHNE) system. This system was developed and deployed to eliminate the need for mission-specific hardware at ground stations.

The system is composed of two parts: one piece of streamlined hardware that is local to the station, and a second "virtual" component in the cloud. The local DAPHNE system occupies a small footprint with general-purpose, easy-to-maintain hardware. When a satellite mission passes overhead, DAPHNE ingests the data and securely pushes the prioritized data to its counterpart in the cloud. Once in the cloud, all the mission-specific functionality can be executed using the full processing resources of our cloud partners.

Removing the need for multiple generations of mission-specific hardware also significantly reduces the footprint at the ground station. It is reduced from racks of ever-growing mission-unique hardware to just half a rack of a shared resource. In addition, DAPHNE removes the need for owning or leasing costly connections. The system is designed to connect to the nearest cloud backbone global infrastructure network, benefiting from economies of scale to reduce the communication cost significantly. This saves the Agency money and positions NASA to take advantage of commercially upgraded and maintained technology.

The system also allows missions to be more nimble. Within the cloud, DAPHNE is customizable, with an architecture that is fully data-driven and scalable. Missions can spin up servers in seconds to process the influx of data with the handshaking and data proto-

cols they need. When done, DAPHNE releases those servers and has no more financial commitment. This has accelerated and helped streamline the data capture, process, and delivery. Once scientists receive the instrument data, they can also access the full processing power of commercial cloud providers. Scientists can spin up thousands of servers to look for patterns in their measurements for mere pennies to the Agency. The benefits extend from there to interagency data, science sharing, and collaborations.

Many cloud providers offer a suite of tools including Artificial Intelligence (AI), data mining, and other innovations. These capabilities give NASA scientists and their partners a rich toolbox to understand our universe.

The DAPHNE team has deployed the system at two stations, one in Alaska, United States, and the other at the remote Arctic island of Svalbard, Norway. The team will deploy two more systems to other ground stations (Puntas Arenas, Chile, and Wallops Island, Virginia, United States), with more stations to be integrated in the coming year from international partners in Asia and Australia.

The DAPHNE system is certainly a technological leap over existing systems. It has contributed to millions of dollars of savings to the Agency. Its true innovation is in its ability to drive new ideas. The system puts new methods of collaboration and processing within the reach of those able to expand human knowledge. To the science community, DAPHNE makes available computational resources that were previously difficult to navigate. From there, the sky is the limit.

# Cloud Tools Power Perseverance's Mission to Mars

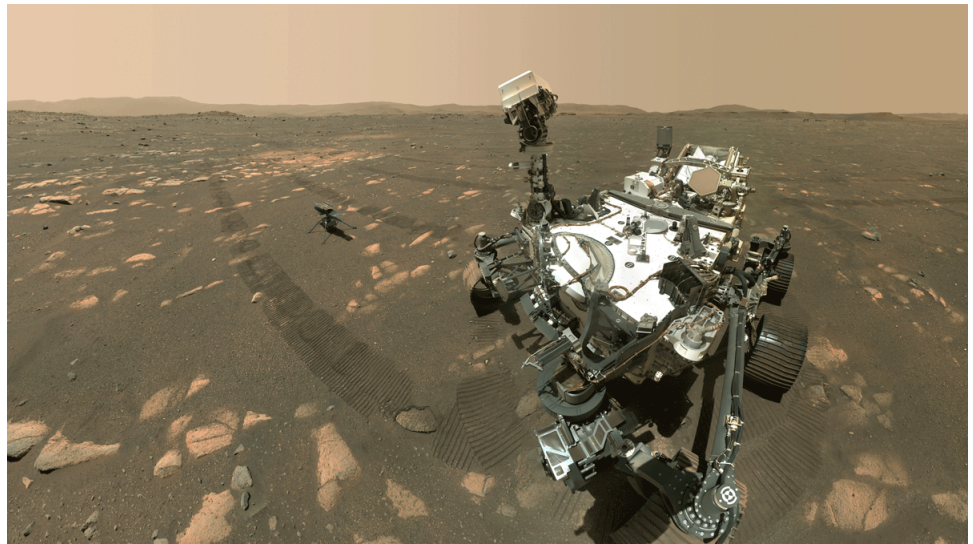
*Daniel Horton, End User Services Program Office Communications, Marshall Spaceflight Center*

The small town of Titusville could be like any other place in Florida. With a population of just over 40,000 people, a courthouse on a town square, and a sampling of shops and restaurants nearby, it is a small city that resembles many others in our country. However, most small towns are not home to a team hard at work on projects like missions to Mars.

In early 2020, many residents of Titusville who previously had been collaborating in person at Kennedy Space Center, had been working from their homes to ensure a successful launch of the Perseverance Rover. This work to get the mission on the way to Mars took virtual teamwork and the use of cloud functionality to keep them connected.

Before landing on the Red Planet in February 2021, it took the work of teams like the Safety and Mission Assurance Launch Services Division to keep the mission to Mars on track. Mike Haddad is part of this team and has been working remotely from his home office in Titusville on Mars Perseverance and other missions.

“When it came to learning from the pandemic and how to collaborate, it



was tough. Especially with a big mission like Mars 2020,” Haddad commented. “Microsoft Teams was an incredible help with daily interaction.”

This interaction would include the file-sharing functionality provided by Teams and Office 365. Through collaborating on documents in the cloud, the Mission Assurance Launch Services Team were empowered to continue their work as if they were all physically in the same office.

“We learned a lot of lessons from talking over e-mail, chat, or even video chat,” mentioned Haddad. The use of these collaboration tools and cloud interactivity made for an increase in productivity that supported the team in this period. Haddad went on to say that “Teams benefited our daily interaction; it took the place of normal person-to-person connection.”

The ability to continue normal operations would enable Haddad’s team to support a successful launch and journey to Mars. In February, as NASA held its breath through the “seven minutes of terror” upon entry into the Martian atmosphere, another type of long-distance file sharing came into play. Video and images were beamed

back from the Red Planet, allowing everyone on Earth to witness the successful landing.

“Seeing it land was inspiring,” said Haddad. “Having a hand in that mission was so rewarding on so many levels. Not only am I able to talk to my nieces and nephews about this car-sized rover on Mars, but when you’re able to send videos to people not involved with the mission, they can see how cool it is too.”

In the same way that files were collaborated on and shared from Kennedy Space Center to other NASA Centers, these image and video files would be shared from Mars for everyone back on Earth to enjoy. From images of the rocky red surface to video of the Ingenuity Helicopter conducting the first Martian flight, these files would lead to further appreciation and understanding of our closest planetary neighbor.

“That’s a benefit to society,” added Haddad. “It makes me feel very appreciative and very humbled. It also gives me inspiration for future missions as well.”



# Mission Cloud Platform (MCP)— Transforming the Mission Environment at NASA

By *Catie Tresslar, Project Support Specialist, Goddard Space Flight Center*

Through executive orders to modernize national cybersecurity, the Biden administration has accelerated cloud and zero-trust architecture adoption efforts. NASA is embracing the shift from legacy data centers to cloud.

On-premise IT infrastructure is vulnerable to security compromises as evidenced by numerous high-profile breaches, including a breach of 40 million Target credit and debit card accounts, plus 70 million customer data records; a Home Depot breach of 56 million credit card accounts; and an eBay breach of 145 million customer accounts.

All of these incidents occurred in data centers. Reliance on legacy technology poses risks to space flight and sensitive mission data. Routine operations and maintenance of legacy systems are both time-consuming and costly to maintain. The Mission Cloud Platform (MCP) is an innovative program operating to fill this critical mission need.

MCP evolved from a Goddard Space Flight Center (GSFC) innovation pilot program to address the growing interest in cloud technologies and enterprise need for secure cloud computing services. The initial MCP platform and team stood up in ten months, received its Authority to Operate (ATO) in December 2019, and has become a key enabler of digital transformation and mission modernization across NASA.

MCP is accelerating mission cloud migration and adoption throughout NASA by offering a scalable and consolidated mission cloud service within NASA. MCP customers save time and money by leveraging scalable on-demand resources that eliminate wasted

capacity and the cost of static data centers. MCP provides the expertise to launch, prototype, and integrate cloud solutions into existing and future ground systems.

MCP cloud engineers preconfigure cloud accounts with integrated tools for security and Information Technology management while protecting NASA data. Access to public-facing services is approved through a tightly controlled configuration management process to mitigate risk. The MCP model lowers barriers to cloud entry by implementing compliance guardrails while supplying fully customizable services to support tenant-specific needs. MCP delivers the power of cloud computing via centralized and consolidated cloud management ideal for enterprise consumption of cloud services.

Currently supporting over 100 projects across seven NASA Centers, MCP supports a diverse mission portfolio, consisting of artificial intelligence (AI) and machine learning (ML), science, engineering, and flight projects. Key customers such as the Data Acquisition Processing and Handling Network Environment (DAPHNE), the Conjunction Assessment and Risk Analysis (CARA), and the Flight Dynamics Facility (FDF) use MCP for a variety of science, mission, and general-use cases.

## Will you be next?

To reach the Mission Cloud Platform team, e-mail [AGCY-MissionCloud@mail.nasa.gov](mailto:AGCY-MissionCloud@mail.nasa.gov).



## CP Stats at a Glance 2020–21



By *Sylvester Placid, Communications Strategist, Communications Program, Marshall Space Flight Center*

During the last 15 months of mandatory telework, the Communications Program (CP) accomplished the following:

- Supported a 300 percent increase in telework
- Achieved a completion status of 84 percent in transitioning NASA to Voice-over-Internet Protocol phones
- Completed installation of 20,000 feet of upgraded optical cable across 3.5 miles of protected marshland for launch operations at Wallops Flights Facility
- Transported more than two terabytes of real-time telemetry data for Space Launch System (SLS) Green Run tests
- Improved network performance by 90 percent for SLS manufacturing at Michoud Assembly Facility
- Developed Live Town Hall service in 60 days from the start of telework to provide video streaming for large virtual events supporting 250,000 total views and more than 35,000 concurrent viewers
- Deployed 30,000 Jabber clients to provide softphone capability for remote users and nine Agency help desks
- Supported an average of more than 6,400 Webex meetings with more than 114,000 attendees totaling more than 6.9 million minutes per month; increased Webex Events' participant limit to 3,000
- Managed more than 150 Video Teleconferencing Services conference room buildouts, refreshes, and remote configurations for mission-critical facilities across NASA Centers during telework access restrictions

# NASA CIO Named One of Best Bosses in Federal IT!

By Eldora Valentine, OCIO Communications Manager, NASA Headquarters

Congratulations to NASA Chief Information Officer Jeff Seaton for being one of the winners of the 2021 FedScoop Award for Best Bosses in Federal IT. FedScoop is honoring the Best Bosses in Federal IT, this year with an emphasis on celebrating the leaders in Federal technology who have helped guide their organizations through the continuing challenges of the COVID-19 pandemic.

Seaton says the past 16 months have been difficult and many people have been put to the test personally and professionally in dealing with the COVID-19 crisis. But he says the experience has taught him how to be an even better leader. "Throughout the response to COVID-19, I have tried to take a forward-leaning approach to prioritizing the health and safety of my workforce. For me it's important to be realistic and human in dealing with people. We are all in this together. COVID-19 has turned everyone's life upside down. I've put our employees first by maximizing flexibilities for them to perform their NASA work while also enabling them to care for themselves and their families. I have encouraged my supervisors to provide the greatest amount of flexibility in what hours employees work., e.g., allowing them to change start/stop times or to break up their eight-hour workdays into sections to better accommodate their family needs at home."

As a leader, Seaton says he is keeping his eyes on some key top priorities for 2021–22. They include protecting NASA's IT infrastructure, delivering great

customer experiences, achieving consistent operational excellence, modernizing and transforming NASA Information Technology, and adopting more digital tools.

You can learn more about other FedScoop Best Bosses by visiting <https://www.fedscoop.com/list/fedscoop-announces-the-best-bosses-in-federal-it-2021/>.

Winners were selected by their peers and colleagues through open voting that occurred over the last few months.



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